



WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: 2003CA39B

Title: Use of bioassays to assess the water quality of wastewater treatment plants for the occurrence of estrogens and androgens

Project Type: Research

Focus Categories: Water Quality, Solute Transport, Treatment

Keywords: wastewater re-use, endocrine disrupters, exposure assessment, environmental estrogens, environmental androgens, vitellogenin, fish bioassay

Start Date: 03/01/2002

End Date: 02/28/2003

Federal Funds Requested: \$19668.00

Matching Funds: \$24370.00

Congressional District: 44

Principal Investigators: Schlenk, Daniel

Abstract: Endocrine disrupting agents encompass a vast array of compounds that have multiple biological targets and degrade water quality, especially if this water is to be re-used for groundwater recharge or agricultural practices. Previous studies in Schlenk's laboratory have observed the occurrence of the androgen, testosterone in concentrations equivalent to estrogens in wastewater obtained from a secondary treatment facility in Mississippi. Although androgenic (anti-estrogenic) effects have been observed in pulp and paper mill effluent, androgenic activity in biological organisms has not been examined in municipal wastewater treatment plants. In addition, estrogenic activities have been observed in effluents from full secondary treatment. Assuming that estrogens and androgens are present in wastewater effluent, the overall aim of this proposal is to assess the efficiency of treatment processes for the removal of these compounds in two of the major water reclamation producers in the western United States: Los Angeles County and Orange County. Utilizing an in vivo bioassay developed in the PI's laboratory, effluents will be evaluated from raw influent, primary, secondary and various tertiary treatment processes for the occurrence of estrogenic and androgenic compounds. The advantage of using the in vivo approach is that indirect mechanisms of estrogenic and androgenic activity can be evaluated

in addition to specific estrogen/androgen receptor agents. The latter could only be evaluated using in vitro cell lines. Thus, compounds that elicit androgenic/anti-estrogenic activity outside of direct androgen receptor activation can be measured (i.e. PCB congeners, PAHs). Wastewater will be measured and assessed prior to and following filtration/chlorination; microfiltration; reverse osmosis; ultraviolet and constructed wetland tertiary processes. Results from these studies will further our understanding of the fate and occurrence of androgenic compounds in reclaimed water and wastewater treatment processes. In addition, qualitative and quantitative measurements of causative agents will provide data necessary for eventual TMDL assessments and implementation.

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